

FEATURES SECTION

Evidence-based orthodontics

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Orthodontics and temporomandibular disorder: a meta analysis.

Kim M-R, Graber TM and Viana MA.

Objectives: To evaluate the evidence on the relationship between orthodontic treatment and temporomandibular disorder (TMD).

Design: A systematic review.

Data sources: All papers identified from a Medline search from 1966 to September 2000, the bibliographies of review articles and a personal reference list, which examined the relationship between orthodontic treatment and TMD.

Study selection: Studies that were case series, surveys, retrospective or prospective studies \pm controls, case-control studies, cohort studies, and randomized controlled trials. Case reports and non-English articles were excluded.

Data extraction: The studies were divided according to research design. Data on symptoms and signs of TMD were extracted using a standardized form.

Data synthesis: A statistical test for homogeneity was conducted. The data were not pooled due to the severe heterogeneity of the study results. The characteristics and outcomes of the studies were presented in tabular form.

Results: Thirty-eight eligible studies were identified of which seven were duplicates. Of the remaining 31 articles, 18 were cross-sectional studies or surveys, 12 were longitudinal studies, and one was a RCT. No study indicated that traditional orthodontic treatment or the use of a specific appliance increased the prevalence of TMD. One study suggested that extraction treatment changed the prevalence of TMD.

Conclusion: The data do not indicate that traditional orthodontic treatments increase the prevalence of TMD.

Implications: Clinicians and patients can be reassured that there is no evidence to support the suggestion that

traditional orthodontic treatment increases the prevalence of TMD. However, further research, using improved methodology and diagnostic criteria, is required.

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Frankel appliance therapy and the temporomandibular disc: a prospective magnetic resonance imaging study.

Franco AA, Yamashita HK, Ledermann HM, Cevindanes LHS, Proffit WR and Vigorito JW.

Objectives: To assess the TMJ soft tissues of Class II division 1 subjects treated with the FR-II compared with those of untreated controls.

Design: A randomized controlled trial.

Setting: São Paulo, Brazil.

Participants: Fifty-six children, with Class II division 1 malocclusions, retrognathic mandibles and overjets of 4.5–10 mm.

Interventions: Both: initial and 18-month MRI scan of TMJs in closed and open mouth positions. *Treatment:* FR-II appliance. *Control:* Observation for 18 months then treatment with FR-II.

Outcome measures: Anatomical disc position in the closed mouth, functional disc position in the open mouth, and disc shape.

Results: There was a small, but statistically significant, difference in the age of the groups at T1 (treatment 10.3 ± 0.9 years, control 10.9 ± 0.7 years; WMD -0.60 , 95 per cent CI $-1.02, -0.18$). At T1 and T2, there was no statistically significant difference in the disc position between the two groups. At T2, all the non-biconcave discs in the treated group (3/28), but none in the control group (5/28), had reverted to the normal biconcave shape ($P < 0.05$).

Conclusions: The prevalence of disc displacement was low (7 per cent). The disc position was not changed, in either group, during this study. The discs that were not

biconcave before treatment normalized during treatment with the FR-II, whereas they stayed the same in the control group.

Implications: Treatment of children, with Class II division 1 malocclusions, with a FR-II appliance does not appear to affect the position of the temporomandibular disc. However, it does allow non-biconcave discs to normalize their shape. This may prevent internal derangement of the TMJs, however, long-term follow-up is required to assess this.

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***In vivo* bracket retention comparison of a resin-modified glass ionomer cement and a resin-based bracket adhesive system after a year.**

Hegarty DJ and Macfarlane TV.

Objectives: To compare the failure rate of brackets bonded with a resin-modified glass ionomer cement (R-MGIC) to those bonded with a resin-based adhesive (R-BA).

Design: A split-mouth, randomized clinical trial.

Setting: Tameside DGH, Ashton-Under-Lyne, UK.

Participants: A total of 1074 teeth in 61 patients receiving fixed appliance therapy.

Interventions: R-MGIC and R-BA randomly assigned in four quadrant/adhesive combinations.

Outcome measures: Number, site, occlusion, and time to first time failure on each tooth over 1 year.

Results: There was a statistically significant difference (RR 2.6, 95 per cent CI 1.7, 3.9) in bracket failure rate for first debonding over 12 months between R-MGIC (10 per cent) and R-BA (4 per cent). There were no significant differences in the failure rates between teeth in the maxillary (7 per cent) and mandibular (7 per cent) arches; premolar (6 per cent) and anterior (8 per cent) teeth, and left (7 per cent) and right (7 per cent) teeth. Brackets in traumatic occlusion failed significantly more frequently than those out of occlusion (RR 4.4, 95 per cent CI 2.3, 8.3). The median survival times were 344 days for R-MGIC and 365 for R-BA.

Conclusions: Both adhesives exhibited acceptable bracket failure rates. However, bracket failures were 2.6 times more likely with R-MGIC than R-BA and four times more likely where they were in traumatic occlusion.

Implications: Clinicians will probably use an R-BA, rather than an R-MGIC for bonding brackets during

orthodontic treatment due to the reduced failure rate. However, this may change if R-MGIC offers better protection against decalcification than R-BA. This trial mentioned, but did not assess decalcification, which could be the subject of further research.

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Rigid versus wire fixation for mandibular advancement: skeletal and dental changes after 5 years.

Dolce C, Hatch JP, Van Sickels JE and Rugh JD.

Objectives: To examine the skeletal and dental changes after 5 years in two groups of patients who had received either rigid or wire fixation for mandibular advancement osteotomy.

Design: A multi-centre, randomized clinical trial.

Setting: San Antonio, TX and Gainesville, FL, USA.

Participants: Ninety-one patients—57 received rigid fixation and 34 received wire fixation.

Interventions: Fixation of the mandible following advancement osteotomy with either rigid fixation (three 2 mm bicortical screws bilaterally) or wire fixation (circumferential mandibular and intra-osseous maxillary 22 gauge wire for 6 weeks).

Outcome measures: Vertical and horizontal movements of the mandible and incisors assessed from lateral cephalograms.

Results: The overjet and overbite increased by similar amounts in both groups during the post-surgical period. There were no statistically significant differences in the horizontal mandibular ($P = 0.4$) or lower incisor ($P = 0.07$) advancement between the two groups post-surgery. There was significantly more horizontal mandibular relapse in the wire fixation group ($P < 0.001$). It increased up to 2 years post-surgery and then stabilized. The horizontal relapse of the LI was similar in both groups ($P = 0.8$).

Conclusions: Five years post-surgery both groups had similar amounts of overjet and overbite. In the wire fixation group proclination of the LI compensated for the relapse in mandibular advancement. In the rigid fixation group, the mandibular position was maintained but the LI retroclined.

Implications: If dental changes are of primary importance the mode of fixation is not critical. However, if skeletal change is desired to improve facial balance then patients are probably better treated with rigid fixation.